MOXA EtherDevice™ Switch

EDS-510A Series Hardware Installation Guide

First Edition, September 2006

Moxa Networking Co., Ltd.
Tel: +886-2-2910-1230
Fax: +886-2-2910-1231
www.moxa.com
support@moxanet.com (Worldwide)
support@usa.moxa.com (The Americas)

P/N: 1802005100000

Package Checklist

The EDS-510A is shipped with the following items. If any of these items are missing or damaged, please contact your customer service representative for assistance.

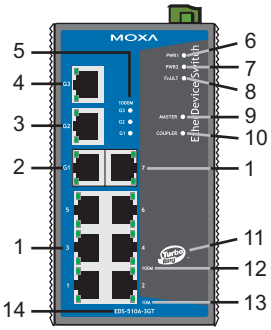
- 1 EDS-510A EtherDevice Switch
- Hardware Installation Guide (this guide)
- CD-ROM with user's manual and Windows utility
- Moxa product warranty statement
- RJ45 to DB9 console port cable
- Protective caps for unused ports
- DIN-Rail mounting kit (attached to the EDS-510A's rear panel by default)

Optional Accessories

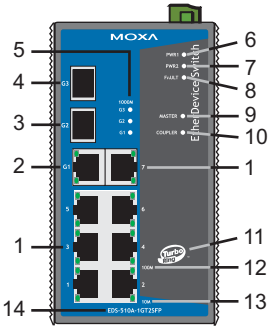
- **SFP-1GSXLC:** Small Form factor Pluggable transceiver with 1000BaseSX, LC, 0.5km, 0 to 60°C
- **SFP-1GSXLC-T:** Small Form factor Pluggable transceiver with 1000BaseSX, LC, 0.5km, -40 to 75°C
- **SFP-1GLXLC:** Small Form factor Pluggable transceiver with 1000BaseLX, LC, 10km, 0 to 60°C
- **SFP-1GLXLC-T:** Small Form factor Pluggable transceiver with 1000BaseLX, LC, 10km, -40 to 75°C
- **SFP-1GLHXLC**: Small Form factor Pluggable transceiver with 1000BaseLHX, LC, 40 km, 0 to 60°C
- **SFP-1GLHXLC-T:** Small Form factor Pluggable transceiver with 1000BaseLHX, LC, 40 km, -40 to 75°C
- **SFP-1GZXLC:** Small Form factor Pluggable transceiver with 1000BaseZX, 80 km, LC, 0 to 60°C
- **ABC-01:** Automatic Backup Configurator via RS-232 Console Port, 0 to 60°C
- **DR-4524**—DIN-Rail Power Supply (24 VDC, 45W/2A, with 85 to 264 VAC input)
- **DR-75-24**—DIN-Rail Power Supply (24 VDC, 75W/3.2A, with 85 to 264 VAC input)
- **DR-120-24**—DIN-Rail Power Supply (24 VDC, 120W/5A, with 88 to 132 VAC/176 to 264 VAC input by switch)
- **EDS-SNMP OPC Server Pro**—CD with EDS-SNMP OPC Server software and user's manual
- **WK-46**—Wall Mounting Kit (will be shipped with the product)

Panel Views of EDS-510A

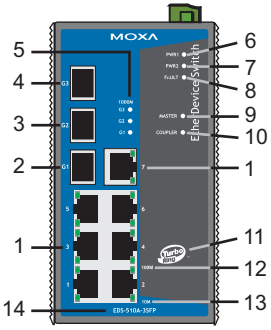
EDS-510A-3GT
Front Panel View



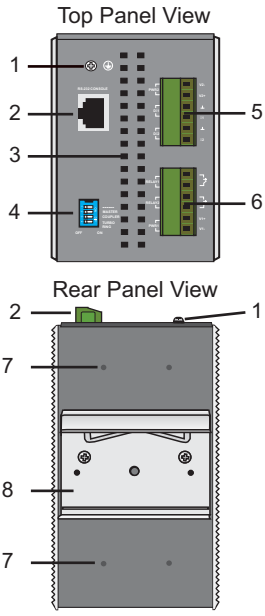
EDS-510A-1GT2SFP
Front Panel View



EDS-510A-3SFP
Front Panel View



1. 1 to 7: 10/100BaseT(X) port
2. G1:
   EDS-510A-3GT
   10/100/1000BaseT(X) port
   EDS-510A-1GT2SFP
   10/100/1000BaseT(X) port
   EDS-510A-3SFP
   1000BaseSX/LX/LHX/ZX port
3. G2:
   EDS-510A-3GT
   10/100/1000BaseT(X) port
   EDS-510A-1GT2SFP
   1000BaseSX/LX/LHX/ZX port
   EDS-510A-3SFP
   1000BaseSX/LX/LHX/ZX port
4. G3:
   EDS-510A-3GT
   10/100/1000BaseT(X) port
   EDS-510A-1GT2SFP
   1000BaseSX/LX/LHX/ZX port
   EDS-510A-3SFP
   1000BaseSX/LX/LHX/ZX port
5. G1, G2, G3: LED indicators for 1000 Mbps ports
6. PWR1: LED for power input 1
7. PWR2: LED for power input 2
8. FAULT: LED indicator
9. MASTER: LED indicator
10. COUPLER: LED indicator
11. Turbo Ring logo
12. 100M: LED indicator for TP port
13. 10M: LED indicator for TP port
14. Model Name



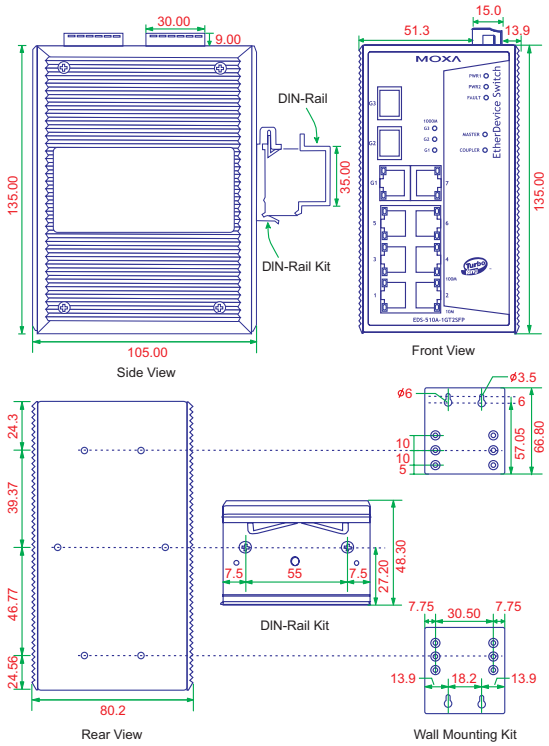
Top Panel:

1. Ground screw
2. RS-232 console port
3. Heat dissipation orifices
4. DIP switches for Ring Master, Ring Coupler, and Turbo Ring
5. 6-pin terminal block for DI 1, DI 2, and PWR 2
6. 6-pin terminal block for PWR1, Relay 1, and Relay 2

Rear Panel:

7. Screw holes for Wall Mounting Kit
8. DIN-Rail Kit

Mounting Dimensions (unit = mm)

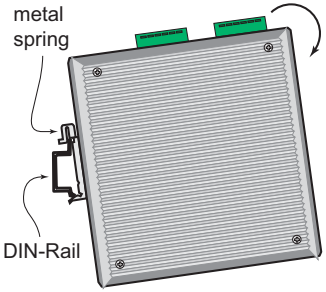


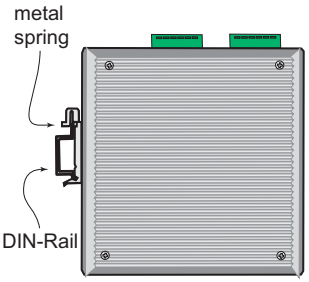
DIN-Rail Mounting

The aluminum DIN-Rail attachment plate should already be fixed to the back panel of the EDS-510A when you take it out of the box. If you need to reattach the DIN-Rail attachment plate to the EDS-510A, make sure the stiff metal spring is situated towards the top, as shown by the following figures.

STEP 1—Insert the top of the DIN-Rail into the slot just below the stiff metal spring.

STEP 2—The DIN-Rail attachment unit will snap into place as shown in the following illustration.



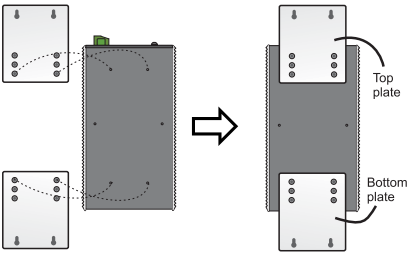


To remove the EDS-510A from the DIN-Rail, simply reverse Steps 1 and 2 above.

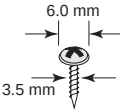
Wall Mounting (Optional)

For some applications, you will find it convenient to mount MOXA EDS-510A on the wall, as shown in the following illustrations:

STEP 1—Remove the aluminum DIN-Rail attachment plate from the rear panel of the EDS-510A, and then attach the wall mount plates, as shown in the figure at the right.



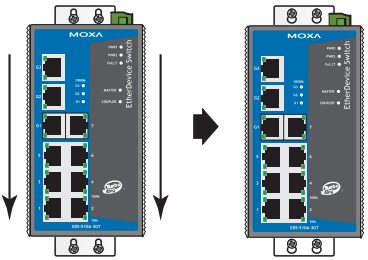
STEP 2—Mounting the EDS-510A on the wall requires 4 screws. Use the EDS-510A, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure on at right.



NOTE Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw through one of the keyhole-shaped apertures of the Wall Mounting Plates.

Do not screw the screws in all the way—leave about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

STEP 3—Once the screws are fixed to the wall, insert the four screw heads through the wide parts of the keyhole-shaped apertures, and then slide the EDS-510A downwards, as indicated in the figure at the right. Tighten the four screws for more stability.



Wiring Requirements

WARNING

Do not disconnect modules or wires unless power has been switched off or the area is known to be non-hazardous. The devices may only be connected to the supply voltage shown on the type plate. The devices are designed for operation with a Safety Extra-Low Voltage. Thus, they may only be connected to the supply voltage connections and to the signal contact with the Safety Extra-Low Voltages (SELV) in compliance with IEC950/ EN60950/ VDE0805.

ATTENTION

This unit is a built-in type. When the unit is installed in another piece of equipment, the equipment enclosing the unit must comply with fire enclosure regulation IEC 60950/EN60950 (or similar regulation).

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your MOXA EtherDevice Switch.

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

You should also pay attention to the following:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point
- NOTE: Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together
- You should separate input wiring from output wiring
- We advise that you label the wiring to all devices in the system.

Grounding the MOXA EDS-510A

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

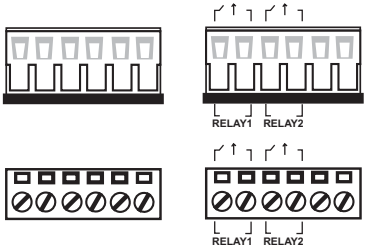
ATTENTION

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

Wiring the Relay Contact

The EDS-510A has two sets of relay outputs—relay 1 and relay 2. Each relay contact uses two contacts of the terminal block on the EDS-510A's top panel. Refer to the next section for detailed instructions on how to connect the wires to the terminal block connector, and how to attach the terminal block connector to the terminal block receptor.

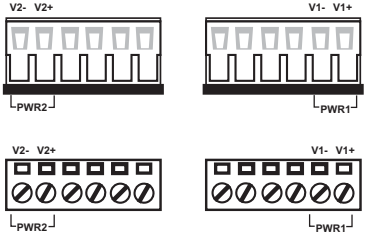
In this section, we illustrate the meaning of the two contacts used to connect the relay contact.



FAULT:
The two sets of relay contacts of the 6-pin terminal block connector are used to detect user-configured events. The two wires attached to the fault contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains closed.

Wiring the Redundant Power Inputs

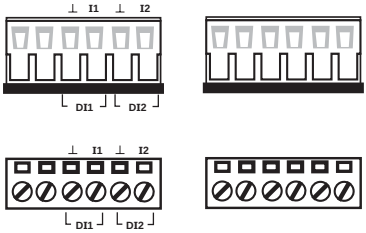
The EDS-510A has two sets of power inputs—power input 1 and power input 2. The top two contacts and the bottom two contacts of the 6-pin terminal block connector on the EDS-510A's top panel are used for the two digital inputs. The top and front views of one of the terminal block connectors are shown here.



STEP 1: Insert the negative/positive DC wires into the V-/V+ terminals, respectively.
STEP 2: To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.
STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the EDS-510A's top panel.

Wiring the Digital Inputs

The EDS-510A has two sets of digital inputs, DI 1 and DI 2. Each DI consists of two contacts of the 6-pin terminal block connector on the EDS-510A's top panel, which are used for the two DC inputs. The top and front views of one of the terminal block connectors are shown here.



STEP 1: Insert the negative (ground)/positive DI wires into the ⊥/I1 terminals, respectively.
STEP 2: To keep the DI wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.
STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the EDS-510A's top panel.

Communication Connections

Each EDS-510A switch has 3 types of communication port:

- 1 RJ45 console port (RS-232 interface)
- 7 10/100BaseTX Ethernet ports
- 3 gigabit Ethernet ports:
  3 10/100/1000BaseTX ports, or 1 10/100/1000BaseTX and 2 1000BaseSFP (mini-GBIC) ports, or 3 1000BaseSFP (mini-GBIC) ports

In this section, we present two types of diagrams—Pinout Diagrams and Cable Wiring Diagrams—that convey information about the ports and the cables used to connect the EDS-510A to other devices:

Pinouts—The "Pinouts" diagrams display the type of signal passing through each of the port's pins.

Cable Wiring—The "Cable Wiring" diagrams present standard cable wiring schemes for cables used to connect the EDS-510A's ports to other devices. These diagrams display three pieces of information:

1. When building your own cable, refer to the "pin-to-pin" cable wiring information displayed between the two vertical dashed lines to see which pin of the connector on the left should be connected to which pin of the connector on the right.
2. The information to the left of the left vertical dashed lines gives the pinouts of the relevant EDS-510A port.
3. The information to the right of the right vertical dashed line gives the pinouts of the opposing device's port.

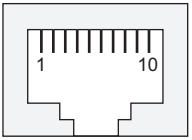
NOTE
1. The pin numbers for male DB9 connectors and hole numbers for female DB9 connectors are labeled on the connector.
2. The pin numbers for 10-pin RJ45 connectors (and ports) are typically not labeled on the connector (or port). Refer to the following Pinout and Cable Wiring diagrams to see how 10-pin RJ45 pins are numbered

RS-232 Connection

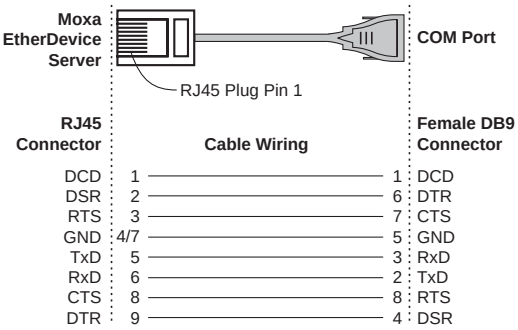
The EDS-510A has one RS-232 (10-pin RJ45) console port, located on the top panel. Use either an RJ45-to-DB9 (see the cable following wiring diagrams) to connect the EDS-510A's console port to your PC's COM port. You may then use a console terminal program, such as MOXA PComm Terminal Emulator, to access the EDS-510A's console configuration utility.

RJ45 (10-pin) Console Port Pinouts

Pin	Description
1	------
2	DSR
3	------
4	GND
5	TxD
6	RxD
7	GND
8	------
9	DTR
10	------



RJ45 (10-pin) to DB9 (F) Cable Wiring



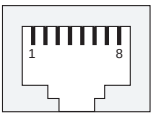
10/100BaseT(X) Ethernet Port Connection

The 10/100BaseT(X) ports located on the EDS-510A's front panel are used to connect to Ethernet-enabled devices. Most users configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch-type) connected to the port.

In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

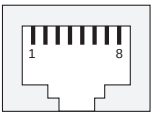
RJ45 (8-pin, MDI) Port Pinouts

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

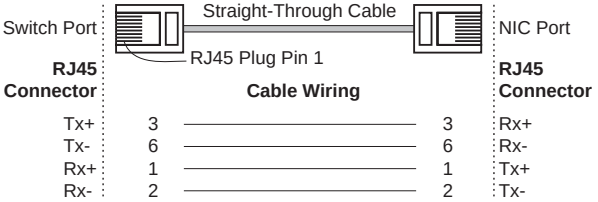


RJ45 (8-pin, MDI-X) Port Pinouts

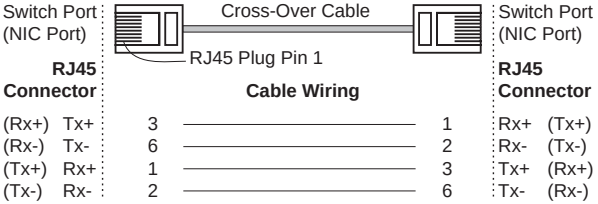
Pin	Signal
1	Rx+
2	Rx-
3	Tx+
6	Tx-



RJ45 (8-pin) to RJ45 (8-pin) Straight-through Cable Wiring



RJ45 (8-pin) to RJ45 (8-pin) Cross-over Cable Wiring

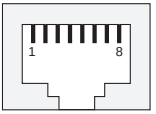

Switch Port (NIC Port)
Cross-Over Cable
Switch Port (NIC Port)
RJ45 Plug Pin 1
RJ45 Connector
Cable Wiring
RJ45 Connector
(Rx+) Tx+ 3 1 Rx+ (Tx+)
(Rx-) Tx- 6 2 Rx- (Tx-)
(Tx+) Rx+ 1 3 Tx+ (Rx+)
(Tx-) Rx- 2 6 Tx- (Rx-)

1000BaseT Ethernet Port Connection

1000BaseT data is transmitted on differential TRD+/- signal pairs over copper wires.

MDI/MDI-X Port Pinouts

Pin	Signal
1	TRD(0)+
2	TRD(0)-
3	TRD(1)+
4	TRD(2)+
5	TRD(2)-
6	TRD(1)-
7	TRD(3)+
8	TRD(3)-



1000BaseSFP (mini-GBIC) Fiber Port

The gigabit Ethernet ports on the EDS-510A-1GT2SFP and EDS-510A-3SFP are 1000BaseSFP Fiber ports, which require using the gigabit mini-GBIC fiber transceivers to work properly. MOXA provides completed transceiver models for different distance requirement.

Multi mode:

- 1000BaseSX
  0 to 500 m, 850 nm (50/125 μm, 400 MHz*km)
  0 to 275 m, 850 nm (62.5/125 μm, 200 MHz*km)
- 1000BaseLX
  0 to 1100 m, 1310 nm (50/125 μm, 800 MHz*km)
  0 to 550 m, 1310 nm (62.5.125 μm, 500 MHz*km)

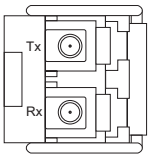
Single mode:

- 1000BaseLX
  0 to 10 km, 1310 nm (9/125 μm, 3.5 PS/(nm*km))
- 1000BaseLHX
  0 to 40 km, 1310 nm (9/125 μm, 3.5 PS/(nm*km))
- 1000BaseZX
  0 to 80 km, 1550 nm (9/125 μm, 19 PS/(nm*km))

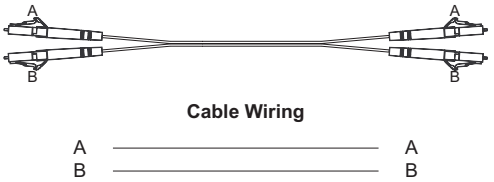
The concept behind the LC port and cable is quite straightforward. Suppose that you are connecting devices I and II; contrary to electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used transmit data from device II to device I, for full-duplex transmission.

Remember to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, as shown below, or A1-to-A2 and B1-to-B2).

LC-Port Pinouts



LC-Port to LC-Port Cable Wiring

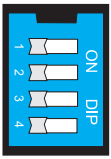


Turbo Ring DIP Switch Settings

EDS-510A series are plug-and-play managed redundant Ethernet switches. The proprietary Turbo Ring protocol was developed by MOXA to provide better network reliability and faster recovery time. MOXA Turbo Ring's recovery time is less than 300 ms-compared to a 3- to 5-minute recovery time for commercial switches-decreasing the possible loss caused by network failures in an industrial setting. There are 4 Hardware DIP Switches for Turbo Ring on the top panel of EDS-510A that can be used to set up the Turbo Ring easily within seconds.

NOTE If you do not want to use a hardware DIP switch to set up the Turbo Ring, you can use a web browser, Telnet, or console to disable this function.

EDS-510A Series DIP Switches



The default setting for each DIP Switch is OFF. The following table explains the effect of setting the DIP Switches to the ON positions.

DIP Switch	Setting	Description
------		Serves no function (reserved for future use).
MASTER	ON	Enables the EDS-510A to be the Ring Master in a Turbo Ring topology, and enables the Turbo Ring break warning. If the EDS-510A is the Master of this Turbo Ring, and the Turbo Ring is broken, the relay will form an open circuit.
	OFF	Disables the EDS-510A from being the Ring Master in a Turbo Ring topology, and disables the Turbo Ring break warning.
COUPLER	ON	Enables the Turbo Ring Coupling function. Use port 7 and G1 of EDS-510A to form the Ring Coupler path.
	OFF	Disables the Turbo Ring coupling function.
TURBO RING	ON	Enables plug-and-play Turbo Ring redundancy. Ports G2 and G3 of EDS-510A are used to form a Turbo Ring.
	OFF	Disables the plug-and-play Turbo Ring redundancy function.

NOTE You must enable the Turbo Ring function first before using the DIP switch to activate the Master and Coupler functions.

NOTE If you do not enable any of the EDS-510A switches to be the Ring Master, the Turbo Ring protocol will automatically choose the EDS-510A with the smallest MAC address range to be the Ring Master. If you accidentally enable more than one EDS-510A to be the Ring Master, these EDS-510A switches will auto-negotiate to determine which one will be the Ring Master.

LED Indicators

The front panel of the MOXA EDS-510A contains several LED indicators. The function of each LED is described in the following table:

LED	Color	State	Description
PWR1	AMBER	On	Power is being supplied to power input P1.
		Off	Power is **not** being supplied to power input P1.
PWR2	AMBER	On	Power is being supplied to power input P2.
		Off	Power is **not** being supplied to power input P2.
FAULT	RED	On	When the corresponding PORT alarm is enabled, and a user-configured event is triggered.
		Off	When the corresponding PORT alarm is enabled and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled.
MASTER	GREEN	On	When the EDS-510A is the Master of this Turbo Ring
		Blinking	When the EDS-510A is Ring Master of this Turbo Ring and the Turbo Ring is broken.
COUPLER	GREEN	On	When the EDS-510A enables the coupling function to form a back-up path.
		Off	When the EDS-510A disables the coupling function.
10M (TP)	GREEN	On	TP port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		Off	TP port's 10 Mbps link is inactive.
100M (TP)	GREEN	On	TP port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	TP port's 100 Mbps link is inactive.
1000M (TP/SFP)	GREEN	On	TP/SFP port's 1000 Mbps link is active.
		Blinking	Data is being transmitted at 1000 Mbps.
		Off	TP/SFP port's 1000 Mbps link is inactive.

Specifications

Technology

Standards	IEEE802.3, 802.3u, 802.3x, 802.1D, 802.1w, 802.1Q, 802.1p, 802.1X, 802.3ad, 802.3z
Protocols	IGMP V1/ V2/ V3 device, GMRP, GVRP, SNMP V1/V2c/V3, DHCP Server/Client, BootP, TFTP, SNTP, SMTP, RARP, RMON and EDS-SNMP OPC Server Pro (optional)
MIB	MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1,2,3,9

Interface

RJ45 Ports	10/100/1000BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
Fiber Ports	optional 1000BaseSX/LX/LHX/ZX (LC connector)
Console Port	RS-232 (10-pin RJ45)
LED Indicators	PWR1, PWR2, FAULT, 10/100M (TP port), 1000M, Ring Master and Ring Coupler
Alarm Contact	Two relay outputs with current carrying capacity of 1A @ 24 VDC
Digital Input	Two inputs with the same ground, but electrically isolated from the electronics • For state “1”: +13 to +30V • For state “0”: -30 to +3V • Max. input current: 8 mA

Optical Fiber—1000BaseSX/LX/LHX/ZX

Distance:

Multi mode:

• 1000BaseSX	0 to 500 m, 850 nm (50/125 μm, 400 MHz*km)
	0 to 275 m, 850 nm (62.5/125 μm, 200 MHz*km)
• 1000BaseLX	0 to 1100 m, 1310 nm (50/125 μm, 800 MHz*km)
	0 to 550 m, 1310 nm (62.5.125 μm, 500 MHz*km)

Single mode:

• 1000BaseLX	0 to 10 km, 1310 nm (9/125 μm, 3.5 PS/(nm*km))
• 1000BaseLHX	0 to 40 km, 1310 nm (9/125 μm, 3.5 PS/(nm*km))
• 1000BaseZX	0 to 80 km, 1550 nm (9/125 μm, 19 PS/(nm*km))

Power

Input Voltage	24 VDC (12 to 45 VDC), redundant inputs
Input Current (@24V)	0.47A: (EDS-510A-3GT) 0.38A: (EDS-510A-1GT2SFP) 0.34A: (EDS-510A-3SFP)
Connection	Two removable 6-pin terminal blocks

Overload Current Protection	Present
Reverse Polarity Protection	Present

Mechanical

Casing	IP30 protection, metal case
Dimensions (W × H × D)	80.5 × 135 × 105 mm (3.17 × 5.31 × 4.13 in)
Weight	1.17 kg
Installation	DIN-Rail, Wall Mounting Kit (optional)

Environmental

Operating Temperature	0 to 60°C (32 to 140°F), standard models -40 to 75°C (-40 to 185°F), wide temp. models
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Regulatory Approvals

Safety	UL60950, UL 508 (pending), CSA C22.2 No. 60950, EN60950
Hazardous Location	UL/cUL Class I, Division 2, Groups A, B, C, and D, ATEX Class I, Zone 2, EEx nC IIC (Pending)
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 (ESD), Level 3 EN61000-4-3 (RS), Level 3 EN61000-4-4 (EFT), Level 2 EN61000-4-5 (Surge), Level 3 EN61000-4-6 (CS), Level 3 EN61000-4-8 EN61000-4-11 EN61000-4-12
Shock	IEC60068-2-27
Freefall	IEC60068-2-32
Vibration	IEC60068-2-6
WARRANTY	5 years

MOXA Internet Services

Customer satisfaction is our number one concern. To ensure that customers receive the full benefit of our products, Moxa has set up on-line support services to provide technical support, driver updates, product information, and user's manual updates.

E-mail for technical support:

support@moxanet.com	(Worldwide)
support@usa.moxa.com	(The Americas)

Website for up-to-date product information:

www.moxa.com